

REMARKS

Claims 1-10, 14-15, and 20-27 are all the claims pending in the application after entry of the new claims.

New Claims 20 and 27 are directed to preferred embodiments of a storage battery, and new Claims 21-26 are directed to preferred embodiments of a collector for storage battery. Support can be found, for example, as described at pages 10-11 and in the Examples of the present specification as originally filed.

Entry of the new claims is respectfully requested along with reconsideration and review on the merits.

Preliminary Items

Applicant kindly appreciates that, on the Office Action Summary sheet, the Examiner has acknowledged receipt of certified copies of the priority documents.

Applicant respectfully requests consideration of the Information Disclosure Statement filed on April 25, 2003.

Restriction Requirement

The Examiner acknowledges Applicant's provisional election with traverse to prosecute the invention of Group I, Claims 1-15. Claims 16-19 are withdrawn from further consideration by the Examiner as being drawn to a non-elected invention.

Applicant elects Group I, Claims 1-15, without traverse.

Claim Objections

Claims 5-15 have been objected to under 37 CFR 1.75(c) as assertedly being in improper form because a multiple dependent claim cannot depend from another multiple dependent claim. For the purposes of the Office Action, the Examiner examined Claims 7, 10, 11 and 13 as if they depended only upon claim 1.

In addition, Claims 14 and 15 have been objected to as assertedly being unclear how they incorporate the collector of claim 1.

Applicant responds as follows.

The issue of multiple dependency in the claims has been obviated by amendment to Claims 5-10 and 14-15, as appears in the Appendix, and by canceling Claims 11-13.

Regarding Claims 14-15, Applicant amends Claim 14, as appears in the Appendix, to recite “[a] said collector” and amends Claim 15 to recite “one or two of said collectors” to clearly reference antecedent basis to the collector of Claim 1.

Accordingly, Applicant respectfully requests reconsideration and withdrawal of the objections.

Claim Rejections - 35 USC §§ 102(b)/103(a)

Claims 1, 5, 7 and 11 are rejected under 35 U.S.C. §102(b) as assertedly being anticipated by Terada et al. (US 5,024,908) for the reasons given in the Office Action.

Claims 1, 5 and 11 are rejected under 35 U.S.C. §102(b) as assertedly being anticipated by Fiorino et al. (US 5,521,029) for the reasons given in the Office Action.

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Claims 1-4, 6 and 7 are rejected under 35 U.S.C. §102(b) as assertedly being anticipated by Gao (US 5,616,437) for the reasons given in the Office Action.

Claims 1, 5, 7 and 11 are rejected under 35 U.S.C. §102(b) as assertedly being anticipated by Will (US 4,326,017) for the reasons given in the Office Action.

Claims 8 and 9 are rejected under 35 U.S.C. §103(a) as assertedly being unpatentable over Will (US 4,326,017) for the reasons given in the Office Action.

Claims 2-4 and 13 are rejected under 35 U.S.C. §102(b)/103(a) as assertedly being anticipated by, and alternatively, as assertedly unpatentable over Will (US 4,326,017) for the reasons given in the Office Action.

Applicant responds as follows.

In order to more clearly claim the Applicant's invention, Applicant amends Claim 1 by incorporating the subject matter of dependent Claim 13, now cancelled.

Original Claim 13 was rejected (along with Claims 2-4) under 35 U.S.C. § 102(b)/103(a) as being anticipated by, and alternatively, unpatentable over Will. Of particular note, the Examiner asserts that "the pressure limitation of claim 13 is a product-by-process limitation". The Examiner states that "The pressure at which the active material is applied during manufacture of the battery is considered obvious." (See page 7, lines 1-3 of the Office Action). However, the Examiner's understanding of Applicant's claimed invention is mistaken. Applicant kindly points out that a pressure described in the original Claim 13 (amended Claim 1) does not indicate a manufactured condition.

Original Claim 13 discloses that a pressure is provided to a collector in a battery after completion, which is apparent from the description in the claims and the present specification. Accordingly, the Applicant traverses the rejection of original claim 13 as its subject matter is now incorporated into Claim 1.

The object of amended Claim 1 is to solve the problem that charge and discharge life performance is deteriorated due to a shortage of the adhesivity between the collector and the active material (see page 7, lines 11-22). This problem cannot be solved by the conventional technique of having the collector be surface-treated with an electrically-conductive ceramic to improve corrosion resistance.

The Examiner is kindly referred, for example, to page 21 of the present specification (Example 2) and to Table 1 on page 22 where the effects of amended Claim 1 are clearly indicated. In Battery No. A in Example 2, the conventional technique of coating with electrically-conductive ceramic (SnO_2) is used. On the other hand, in Battery Nos. B, C and D wherein a pressure is maintained in the range of amended Claim 1, charge and discharge life is greatly superior by up to eight times compared to that in Battery No. A (see Fig. 9). Therefore, it is apparent that amended Claim 1 results in extremely superior effects which one skilled in the art cannot expect.

Applicant submits that each and every one of the references that the Examiner cites does not disclose or suggest that "said collector has an active material provided thereon and there is provided a structure such that a pressure of 4×10^4 to 20×10^4 Pa is maintained perpendicular to the surface of said collector" and that the above problem (the shortage of the adhesivity) can be

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solved by this technique. Therefore, amended Claim 1 and dependent claims thereof clearly have novelty and are unobvious over these references.

For at least the foregoing reasons, Applicant respectfully requests reconsideration and withdrawal of all anticipation and obviousness rejections.

Allowable Subject Matter

Applicant kindly thanks the Examiner for acknowledging that certain of Applicant's claims would be allowable if modified. Claims 10, 12, 14 and 15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims for the reasons given in the Office Action.

Applicant responds as follows.

Applicant amends Claim 10 to be rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claim 12 is cancelled.

Accordingly, it is apparent that Claim 10 and dependent Claims 21-26 thereof are patentable and such is respectfully requested.

Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the

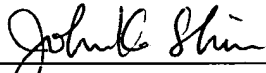
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Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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PATENT TRADEMARK OFFICE

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APPENDIX
VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Claims 11-13 and 16-19 are canceled.

The claims are amended as follows:

1. (Amended) A storage battery comprising a collector [for storage battery] comprising a thin electrically-conductive ceramic layer formed on a collector substrate,
wherein said collector has an active material provided thereon and there is provided a structure such that a pressure of 4×10^4 to 20×10^4 Pa is maintained perpendicular to the surface of said collector.
2. (Amended) The [collector for] storage battery according to Claim 1, wherein a process involving the deposition from a gas phase is used to form said thin electrically-conductive ceramic layer on the surface of said [a] collector substrate.
3. (Amended) The [collector for] storage battery according to Claim 2, wherein said process involving the deposition from a gas phase is sputtering process.
4. (Amended) The [collector for] storage battery according to Claim 2, wherein said process involving the deposition from a gas phase is [plasma] CVD process.
5. (Amended) The [collector for] storage battery according to any one of Claims 1 to 4, wherein the material constituting said collector substrate is a metal or metal alloy selected from the group consisting of lead, lead alloy, tin, tin alloy, bismuth and bismuth alloy.

6. (Amended) The [collector for] storage battery according to any one of Claims 1 to 4, wherein the material constituting said collector substrate is an electrically-conductive polymer.

7. (Amended) The [collector for] storage battery according to any one of Claims 1 to 4 [6], wherein as said electrically-conductive ceramic there is used SnO₂.

8. (Amended) The [collector for] storage battery according to Claim 7, wherein said electrically-conductive ceramic SnO₂ comprises an Sb compound incorporated therein in an amount of from 0.5 mole % to 8 mole % based on the total amount of moles of Sn and Sb.

9. (Amended) The [collector for] storage battery according to Claim 7 [or 8], wherein said electrically-conductive ceramic SnO₂ comprises F incorporated therein in an amount of from 7 mole % to 60 mole % based on the total amount of moles of Sn and F.

10. (Amended) A [The] collector for storage battery comprising a thin electrically-conductive ceramic layer formed on a collector substrate [according to any one of Claims 1 to 6], wherein as said electrically-conductive ceramic, any silicon compound selected from the group consisting of TiSi₂, Ti₅Si₃, TaSi₂, Ta₅Si₃, NbSi₂ and Nb₅Si₃ is used.

14. (Amended) The storage battery according to any one of Claims 1 to 4 [Claim 13], comprising a bipolar battery type structure having a plurality of bipolar type electrodes each comprising a positive active material provided on one side of said [a] collector [for storage battery] and a negative active material provided on the other side, wherein the positive active

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material side of one bipolar electrode being opposed to the negative active material side of another, and a separator for retaining an electrolyte provided between said laminated bipolar type electrodes.

15. (Amended) The storage battery according to any one of Claims 1 to 4 [Claim 13], comprising one or two of said collectors [for storage battery] having an active material provided on one surface thereof but free of active material on the other surface, wherein the surface of said collector which is free of active material forms at least a part of the outer case of said storage battery.

Claims 20-27 are added as new claims.